REMARKS

After entry of the instant Amendment, claims 1, 4, 7, 9-12, and 15-16, 19, 20, and 24 are pending in the instant application, with claims 1, 7, 15, and 16 in independent form. This amendment does not constitute an introduction of a new matter, as this limitation was originally disclosed.

Claim Objection

The examiner objects to claim 1 for its informality. The claim has been amended to recite "clamping force." Applicants submit that the objection is fully addressed and is made moot.

Previously allowable subject matter

Applicants thank the Examiner for finding the subject matter of claims 17 and 22 allowable. The elements of claim 17 were incorporated into claim 1 as amended herein, and the elements of claim 22 were incorporated into claim 15 as amended herein. Claims 17 and 22 were canceled.

Applicants respectfully submit this amendment makes claims 1 and 15, and claims 4, 19, 20, and 24, which are dependent on these claims allowable. Please note that the rejection reasons for these claims are therefore not addressed.

Rejection reasons for claims 7, 9-12 and 16 are addressed below.

Rejections under 35 USC §103(a)

Hirano in view of Bottini and Shimizu

Claims 7-12, 16 stand rejected under 35 U.S.C. §103(a) over US 2002/153618 (Hirano et al.) in view of US 3808673 (Bottini) and U.S. 4,722,968 (Shimizu). Claim 8 is canceled and its limitations are incorporated into claim 7 as amended. Therefore, claims 7 and 16 now clearly state that the semiconductor device comprises wire bonding. Claims 7, 9-12, and 16 are pending.

Hirano describes forming smaller sized semiconductor devices that includes a die chip mounted onto a surface of a substrate using an adhesive, bond wires, a silicone-containing overmold resin, and solder balls, and in certain configuration, applying the overmold resin by

injection molding. The Examiner considers Bottini supplies information lacking in Hirano, i.e. the clamping force at the time of injection molding and the viscosity of liquid composition as well as the modulus of the cured product. The Examiner notes that Shimizu teaches addition-reaction curable liquid silicone composition.

As explained in Applicants' previous submission, Hirano identifies the wire sagging problem (paragraph [0006]) and the wire flow problem when insulating resin is injected under pressure (paragraph [0007]) during a transfer molding process. Hirano's solution to these problems is to manufacture devices with certain configurations, and in particular, to make the device smaller and shorten the wire length, as described in paragraph [0024] ("it is possible to . . . shorten the wire length . . ., leading to the suppression of an increase in the wire sagging. As a result, in the step for sealing the semi-conductor chip and the wire with a resin sealing body, the flow of the wire caused by the insulating resin injected upon pressure can be suppressed and therefore, the occurrence of a short-circuit between two adjacent wires can be suppressed"), and in paragraphs [0080] to [0104]. See, specifically, paragraph [0097]. Hirano does not teach or suggest the types of resin or injection conditions because Hirano's solution to sagging-wire problem is to make the wire shorter by making smaller devices. Hirano in essence teaches that resins and injection conditions need not be changed from the conventional methods known in the art. Nothing in Hirano would prompt a search for a suitable resin or condition for injection molding.

With regard to Bottini, the Examiner cites column 4, lines 25-43 as describing the injection condition of the present invention, but this passage describes the process of encapsulating an emitter-detector pair already encapsulated in clear silicone resin with an opaque plastic molding material. See lines 32-34. The transfer pressure and the clamp pressure disclosed by Bottini are for molding black plastic material over the already encapsulated emitter-detector pair. At this point, no wire is exposed to be subject of the sweeping problem. There is no detail of the encapsulation process of the emitter-detector other than that it can be cured by heating the device covered by the curable composition at 150 degrees Celsius for 2 hours. Therefore, the transfer pressure and clamp pressure offer no guidance as to the suitable pressure when resin is injected and cured onto exposed wires

In contrast, as shown in the figures of the present application, the addition reaction curable silicone composition that is the molding material is injected so that it directly encapsulates the semiconductor device without an intervening material. Claims are amended to describe the disclosure of the figures to clearly state that the silicone composition comes in direct contact with the wire used for wire bonding.

Shimizu describes certain curable silicone compositions, but the described materials differ from those of the claimed invention having a viscosity of 80 to 3000 Poise and a cured product of the silicone composition has a modulus of 100 to 1,000 megaPascals. As seen in the examples of Shimizu, the cured material of Shimizu has the tensile strength of 5.9 and 6.7 MPa, which is much lower and outside the range of the claim. It follows that the curable composition before cure disclosed in Shimizu is different from those of the present invention, and therefore Shimizu cannot be assumed to suggest similar injection conditions.

Applicants submit that claims 7 and 16 as amended are not obvious over Hirano in view of Bottini and Shimizu. and claims 9-12 that depend on claim 7 and incorporate all limitations of claim 7 are also not obvious.

Therefore, Applicants submit all claims are in conditions for allowance and request withdrawal of all rejection reasons and allowance of all claims.

This reply is being submitted within the period for response to the outstanding office action in view of the petition for necessary extensions of time. You are authorized to charge deposit account 04-1520 for any fees necessary to maintain the pendency of this application. You are authorized to make any additional copies of this sheet needed to accomplish the purposes provided for herein and to charge any fee for such copies to deposit account 04-1520.

Respectfully Submitted,

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